Soft-Shell Clam (*Mya arenaria*) Resource Inventory—Buckmans Creek, Charlotte County, New Brunswick—1984

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ABSTRACT

Angus, R.B. and P. Woo. 1985. Soft-shell clam (Mya arenaria) resource inventory - Buckmans Creek, Charlotte County, New Brunswick - 1984. Can. MS Rep. Fish. Aquat. Sci. 1842: iv + 17 p.

In 1984 a soft-shell clam (Mya arenaria) resource inventory in Buckmans Creek, Charlotte County, New Brunswick revealed a standing stock of 2,036 bu (55,576 kg) of market-sized (≥38 mm shell length) clams and 50 bu (1,358 kg) of pre-recruits (32 to 37 mm shell length). Growth rate analysis showed that this population is slow growing compared to other Maritime populations. Inspection of size frequency distributions indicate a recruitment failure approximately 4-5 yr prior to the survey. A recommendation is made to harvest and depurate the market-sized clams.

RÉSUMÉ

Angus, R.B. and P. Woo. 1985. Soft-shell clam (Mya arenaria) resource inventory - Buckmans Creek, Charlotte County, New Brunswick - 1984. Can. MS Rep. Fish. Aquat. Sci. 1842: iv + 17 p.

En 1984, un relevé des ressources en myes (Mya arenaria) à Buckmans Creek, comté de Charlotte, au Nouveau-Brunswick, a révélé que la biomasse s'élevait à 2,036 boisseaux (55,576 kg) de myes de taille marchande (longueur de la coquille ≥38 mm) et à 50 boisseaux (1,358 kg) de pré-recrues (32 à 37 mm). Une analyse du taux de croissance a indiqué que la croissance de cette population était lente comparativement à celle d'autres populations de myes dans les Maritimes. L'étude des distributions de fréquences concernant la taille indique un échec du recrutement environ 4-5 ans avant la réalisation du relevé. On recommande la récolte de toutes les myes de taille marchande.

INTRODUCTION

As part of an ongoing soft-shell clam (Mya arenaria) resource inventory in Charlotte County, New Brunswick (Robert and Smith 1980; Yurick 1982; Frost and Yurick 1983; Angus et al. 1985a), Buckmans Creek was surveyed during the summer of 1984. Located at the northern tip of Beaver Harbour (Fig. 1), Buckmans Creek has been closed to soft-shell clam harvesting since 1949 (Waller et al. 1976). This closure was imposed because of prevalent bacteriological contamination and the presence of paralytic shellfish poisoning (PSP) during the summer months. Current interest in soft-shell clam depuration in Charlotte County led to the undertaking of a resource inventory to determine areas suitable for depuration, to identify standing stocks, and to gather data on growth, recruitment and productivity.

MATERIALS AND METHODS

The survey was conducted between June and August 1984 using a sampling strategy previously described by Angus et al. (1985a and b). Parallel transects were run from a baseline at the high-tide mark at 20 m intervals. Sample stations were 20 m apart giving a sampling intensity of 0.025%. The survey extended from the mouth of Buckmans Creek and progressed northward until clams were no longer present in the substrate. Sample analysis followed methods previously described by Angus et al. (1985a and b).

A von Bertalanffy growth equation was generated and age/size classes were determined for the population. These size classes were subdivided and designated into the following recruitment categories: 0 to 31 mm shell length - early recruits, 32 to 37 mm - pre-recruits, and ≥38 mm - recruits and market size. The total standing stock in bushels and kilograms per hectare (ha) for recruitment categories was determined using the values for the number of clams per bushel given in Angus et al. 1985a.

A size frequency distribution was plotted using shell length intervals of 1.0 mm. The percentage composition of each recruitment category was obtained from the frequency distributions. Using these values and the estimated total number of individuals in a known sampling area the density of clams within the early recruits' and recruits' size classes was calculated and plotted. Subsequently, density isopleths were drawn by eye to show areas of concentration.

Soft-shell clam and water quality samples were taken periodically to test the bacteriological quality and for the presence of PSP.

RESULTS

Samples were collected at 260 stations along 37 transects (Fig. 2). The survey constituted a total sampled area of 10.36 ha with a sampling efficiency of 0.025%. Substrate in the sampled area ranged from gravel at the mouth of the creek to soft mud underlain with clay at the head. The central portion of the creek was constantly submerged by water.

Age at size classes determined by a von Bertalanffy growth equation are shown in Table 1. Market-sized clams (≥38 mm) are approximately 7 yr old and older. Market-size clams have an estimated standing stock of 2,036 bu (55,576 kg) for the area, 196.5 bu per hectare (bu/ha)(Table 1). Standing stock of the pre-recruits (32 to 37 mm - clams expected to enter the fishery in 1 yr or less) is calculated at 50 bu (1,358 kg) for the total area, 4.8 bu/ha.

A size frequency distribution (Fig. 3) showed that over 53.8% of the standing stock in the sampled area was market sized. The distribution is bimodal with peaks at 10 mm and 50 mm shell length. The largest component is the 50 mm length class which consisted of 5% of the total population. Density isopleths of the early recruits and recruits are presented (Fig. 4 and 5). Pre-recruits could not be plotted because of their very low densities.

Results of sampling for bacteriological contamination and PSP given in Table 2 show clams were contaminated with bacteria and PSP at levels higher than those permitted for harvesting.

DISCUSSION

Growth rates of clams sampled from Buckmans Creek were slower than others reported in the literature (Newcombe 1936; Robert 1981; Witherspoon 1982; 1983; Angus et al. 1985b). Although it is reported that a soft-shell clam will reach a shell length of 50 mm in 7 yr, those at Buckmans Creek require 9 yr. Slow growth may be due to low salinity in the area caused by the freshwater runoff of the creek itself; low salinity slows growth of soft-shell clams (Newcombe 1936).

Standing stock estimates compare favourably with other areas in Charlotte County. For example, Buckmans Creek has a standing stock density of recruits (155 bu/ha) similar to that of St. Andrews Area 2 (144 bu/ha) (Angus et al. 1985b). The bimodal distribution of the population (Fig. 3), unlike that in other areas, indicates poor recruitment of one or more year classes, possibly related to mortalities caused by low salinities. Bivalve larvae are particularly sensitive to salinity and will not survive in salinities below 12.5 ppt (Calabrese and Davis 1970).

Over 50% of the population was market size. As this segment of the population will eventually decline due to natural mortality, it may be prudent to harvest and depurate the clams now. The resultant decline in clam densities may reduce competition for food and space and provide conditions favouring increased growth in early and pre-recruit size classes.

ACKNOWLEDGEMENTS

We would like to thank B. Groom of the New Brunswick Department of Fisheries for supporting this survey, J. Pomeroy for conducting the survey, and T. Amaratunga and D. Pezzack for reviewing the manuscript.

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Table 1. Age, length, and number of soft-shell clams for Buckmans Creek.

Shell Length	Age[1]	Recruitment Class	bu/ha[2]	kg/ha[3]
0-31	1-5	Early recruits	not calculated	
32-37	6	Pre-recruits	4.8	132
38-42	7			
43-46	8			
47-49	9	Recruits	196.5	5,365
50-52	10			
53-54	11			
55-56	12			

[1]From von Bertalanffy growth equation L in f = 67.38, t(0) = 1.33, K = 0.1703.

[2]From Angus et al. 1985a - pre-recruits 4,505 clams/bu, recruits 2,000 clams/bu.

[3]From Hawkins and Rowell 1984 - 27.3 kg/bushel.

Table 2. Date and location of bacteriological and PSP sampling.

Date	Location	Bacteriological level (fecal califorms)	PSP level µg/100 g meat
July 3, 1984	Mouth of Creek	330	446
August 2, 1984	Head of Creek	3,500	256
August 2, 1984	Mouth of Creek	230	279

[1]Maximum level allowed - 100 MPN fecal coliforms.

[2]Harvest allowed when <80µg/100 g.

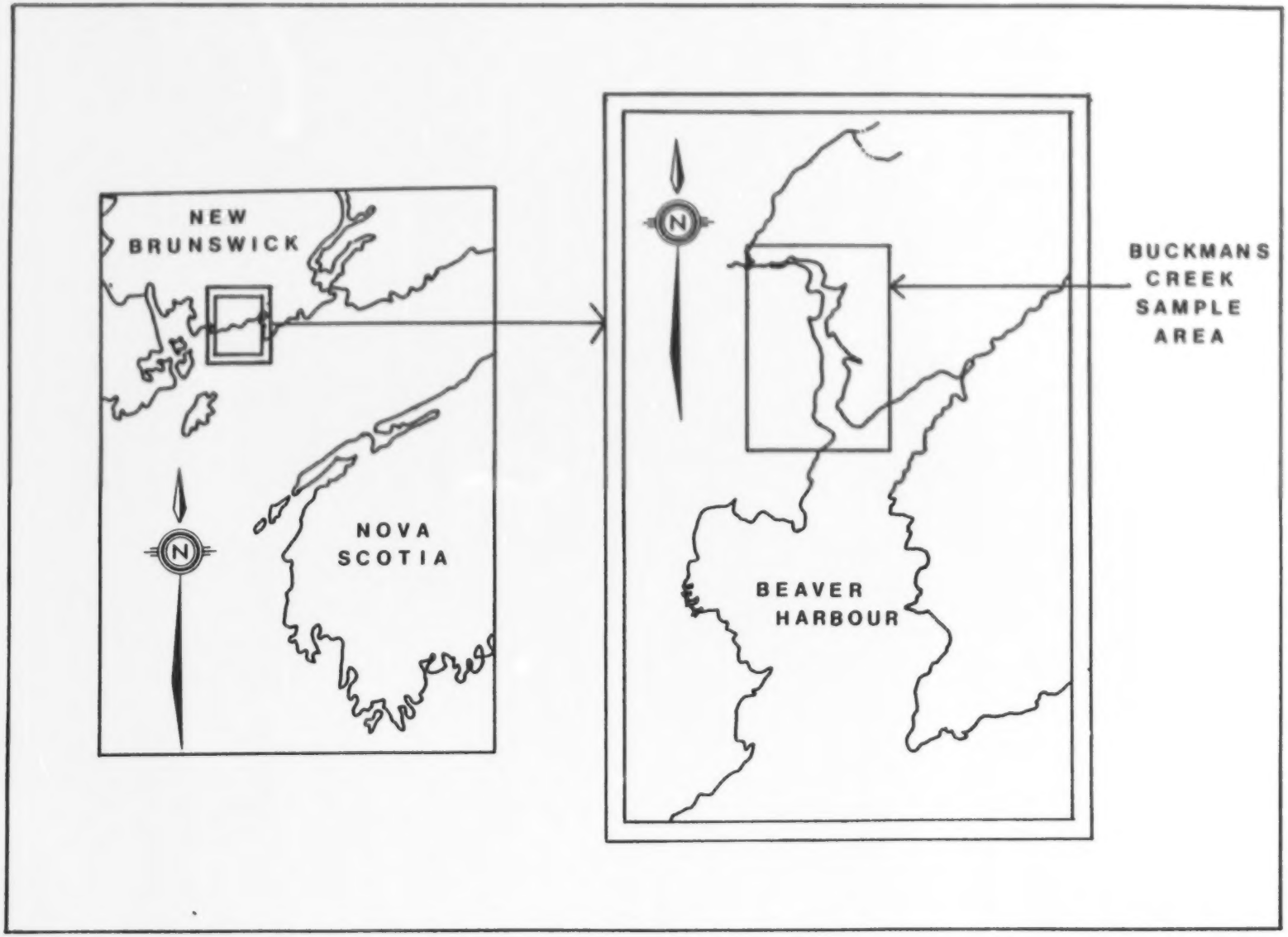

Fig. 1. Location of Buckmans Creek sample area.

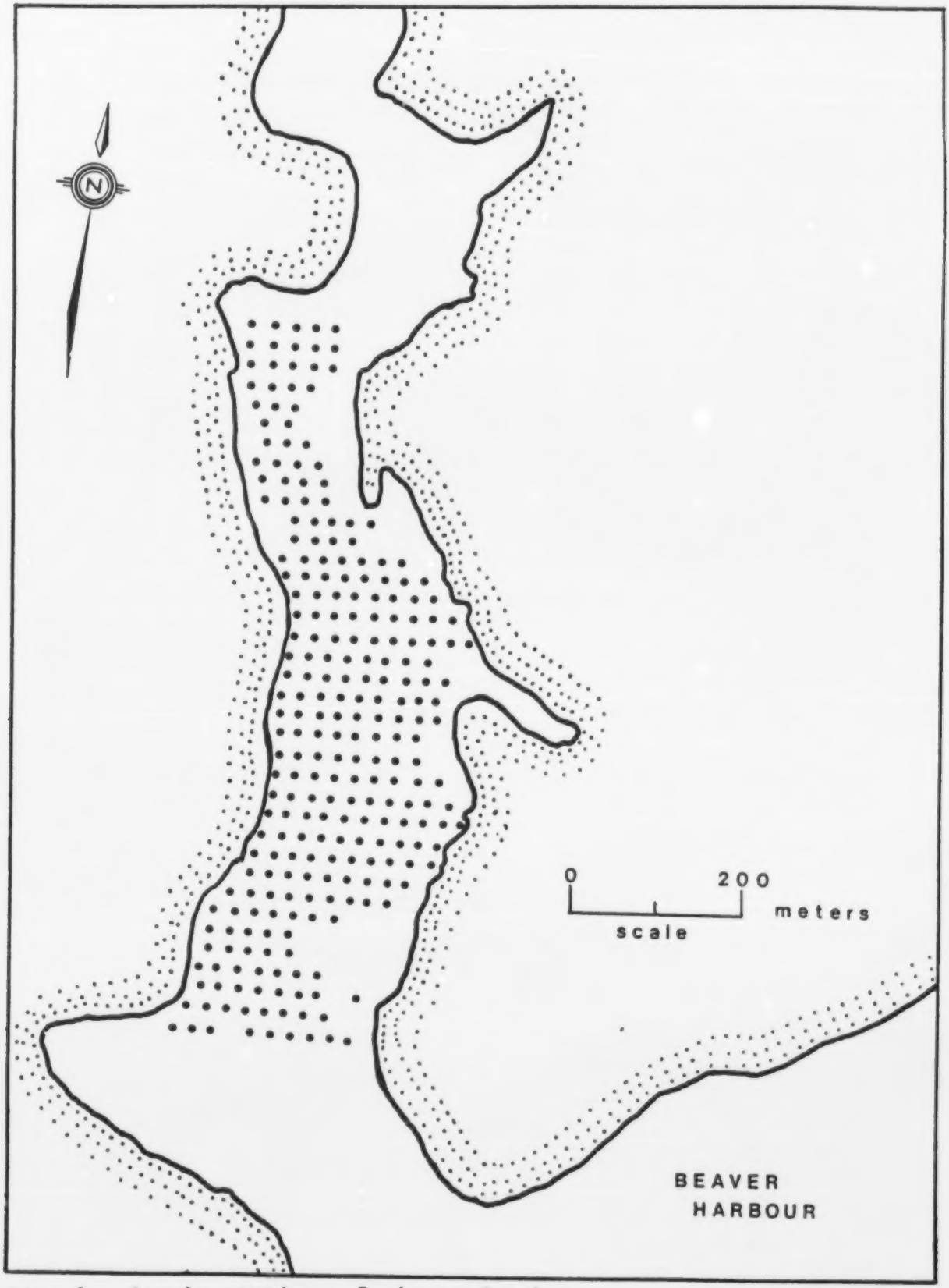

Fig. 2. Sample stations, Buckmans Creek.

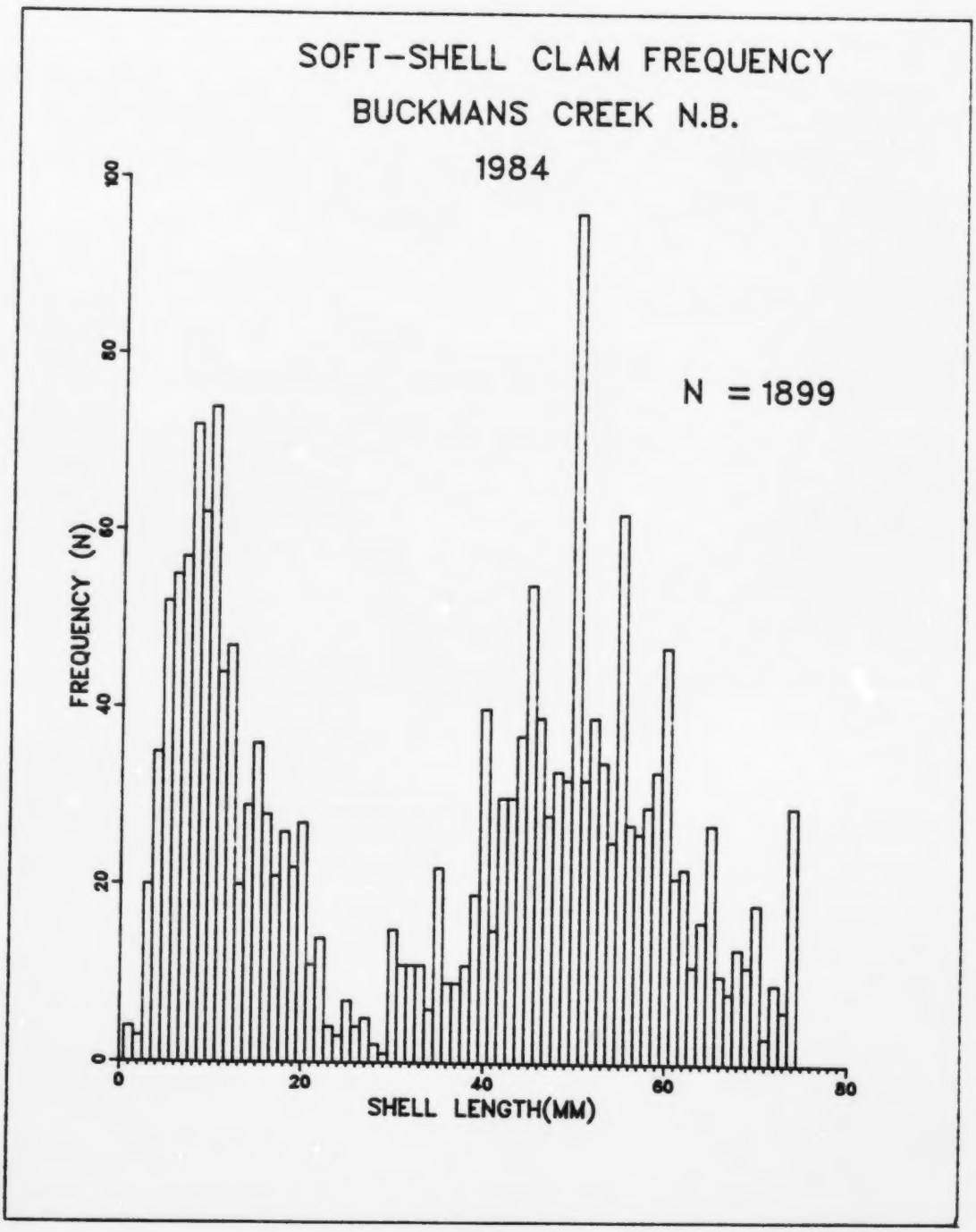

Fig. 3. Size distribution of soft-shell clams collected at Buckmans Creek.

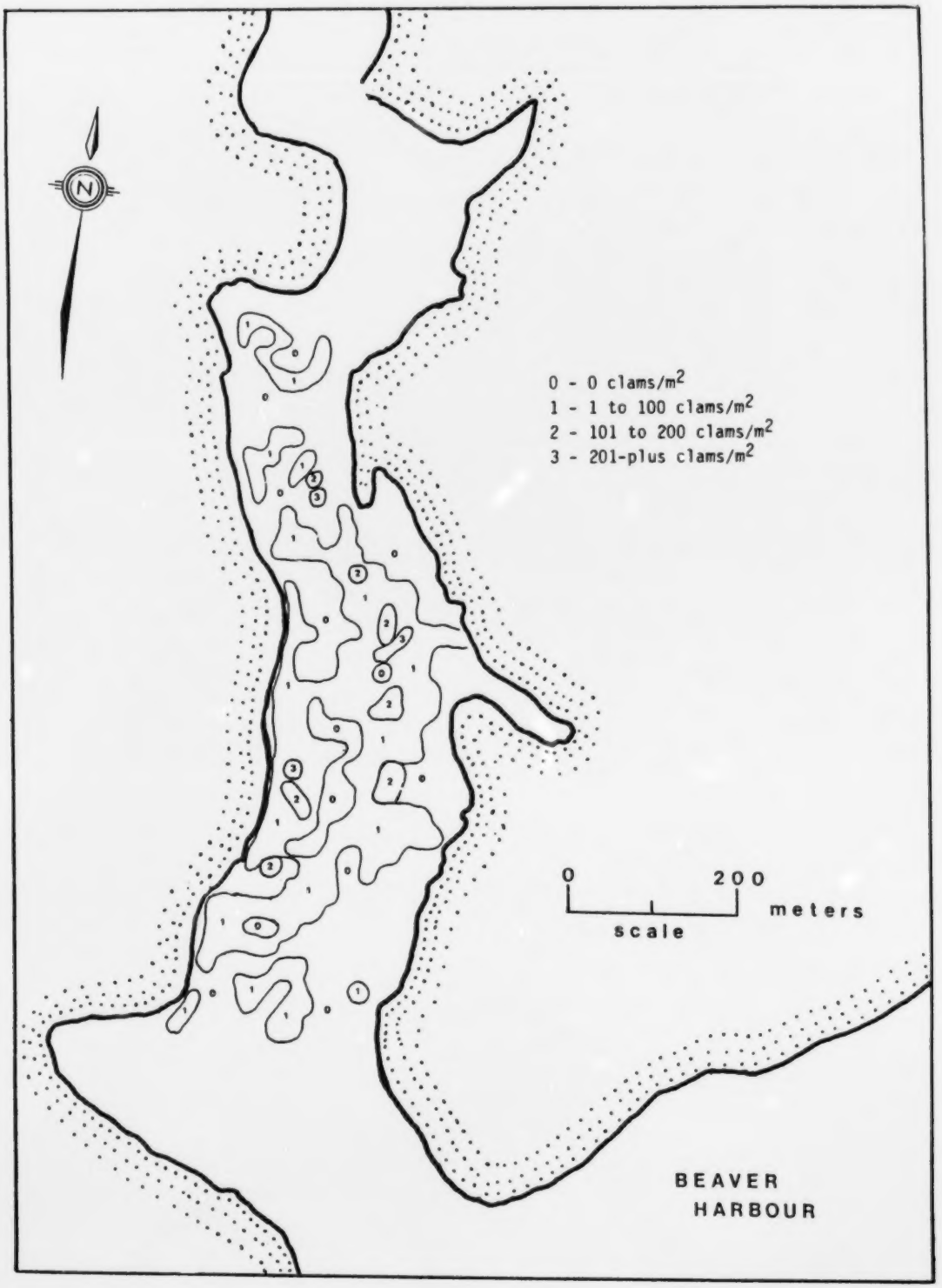

Fig. 4. Density **isopleths** of early-recruits (0-31 mm) in Buckmans Creek.

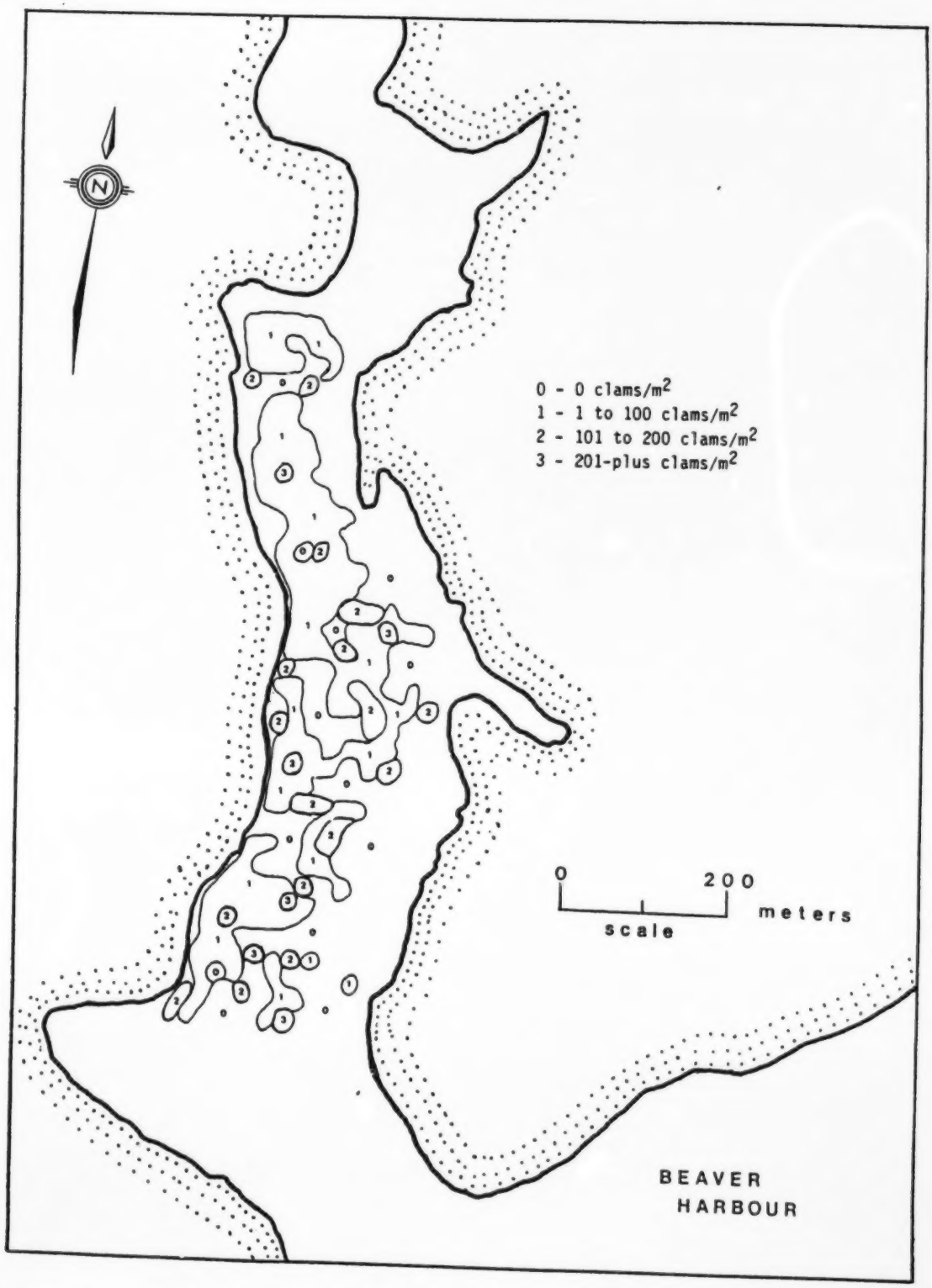

Fig. 5. Density isopleths of recruits (≥38 mm) in Buckmans Creek.